

# MASSACHUSETTS WATER RESOURCES COMMISSION

## Hydrologic Conditions in Massachusetts

### July 2016 Summary



- July precipitation was below normal for all regions except Western and Cape Cod & Islands.
- July streamflows were below normal.
- July groundwater levels were below normal except Cape Cod & Islands.
- July reservoir levels were normal and below normal.
- Some Massachusetts Drought Management Plan thresholds are triggered. See Appendix I for additional information and Appendix II for description of drought indices.

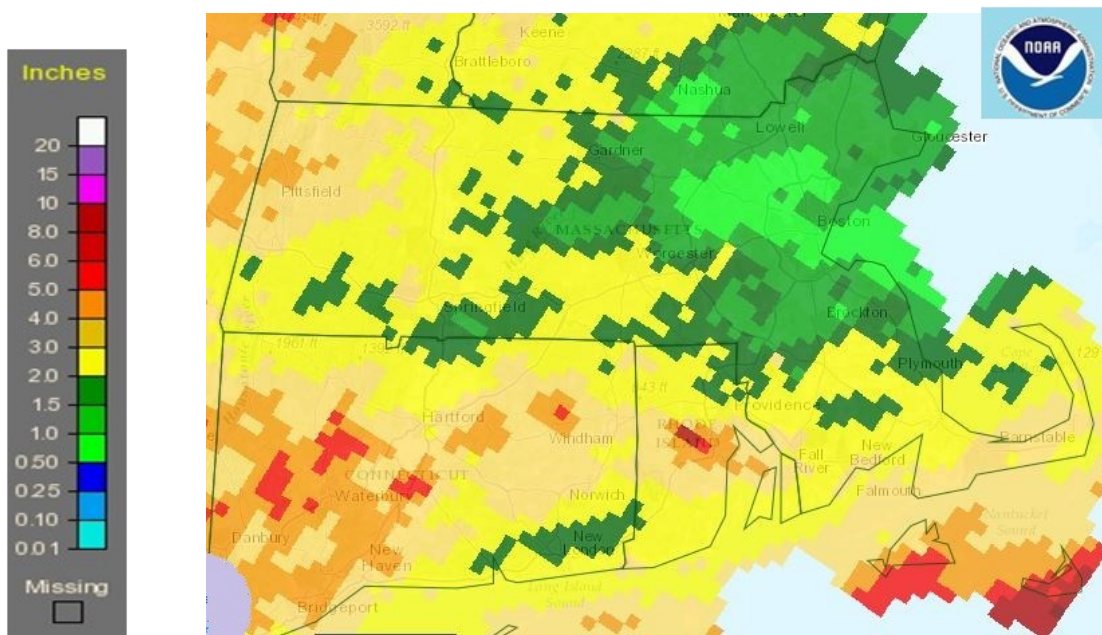
#### PRECIPITATION CONDITIONS

**Summary:** July precipitation was below normal for all regions except Western and Cape Cod & Islands.

Region	July Estimated Rain-fall: Composite Sites Reporting (inches)	Departure from Normal (inches)	MA Drought Management Plan Levels		Key to Levels
			Standardized Precipitation Index (SPI)	Percent of Normal Index	
Cape Cod & Islands	2.64	-0.27	Normal	Advisory	Normal
Central	1.97	-1.85	Watch	Watch	Advisory
Connecticut River	2.08	-2.13	Advisory	Watch	Watch
Northeast	1.52	-1.96	Advisory	Watch	Warning
Southeast	1.72	-1.63	Normal	Advisory	Emergency
Western	3.72	-0.56	Normal	Normal	

#### Advanced Hydrologic Prediction Center July 2016 Observed Precipitation

found at <http://water.weather.gov/precip/> estimated from radar data correlated to NWS rainfall gauge reports



## STREAMFLOW CONDITIONS

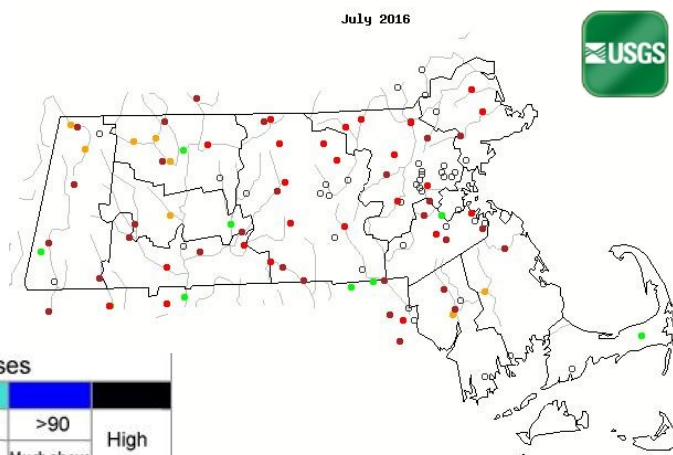
**Summary:** July streamflow conditions were below normal.

General Streamflow Conditions in Massachusetts July 2016		
Region	Streamflow Conditions	MA Drought Management Plan Streamflow Index
Cape Cod & Islands	ND	ND
Central	Below Normal	Watch
Connecticut River	Below Normal	Watch
Northeast	Below Normal	Watch
Southeast	Below Normal	Advisory
Western	Below Normal	Watch

**Note:** Streamflow conditions for individual streamflow-gaging stations may differ from general conditions.  
ND: no data

Average July 2016 streamflow monitored by the Commonwealth of Massachusetts and United States Geological Survey (USGS) cooperative stream gaging program. Updated maps may be found at: <http://waterwatch.usgs.gov/index.php?r=ma&id=mv01d>

**Map of Monthly Streamflow**  
Compared to Historical Streamflow for the Month of the Year

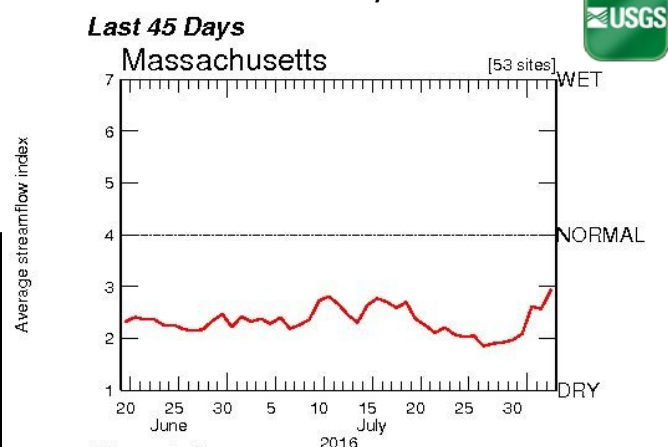


This graph depicts a composite daily streamflow relative to normal streamflow for Massachusetts for the 45-day period of June 20 to August 2. An updated summary plot may be found at: <http://waterwatch.usgs.gov/index.php>

**KEY:**

- 1 = New record low for day
- 2 = < 10<sup>th</sup> percentile
- 3 = 10<sup>th</sup> – 24<sup>th</sup> percentile
- 4 = 25<sup>th</sup> – 74<sup>th</sup> percentile
- 5 = 75<sup>th</sup> – 89<sup>th</sup> percentile
- 6 = > 90<sup>th</sup> percentile
- 7 = New record high for day

**Time Series Plot of Real-Time Streamflow Compared to Historical Streamflow for the Day of the Year**



## GROUNDWATER LEVELS

**Summary:** July groundwater levels are below normal in all regions except Cape Cod/Islands.

### General Groundwater Conditions in Massachusetts July 2016

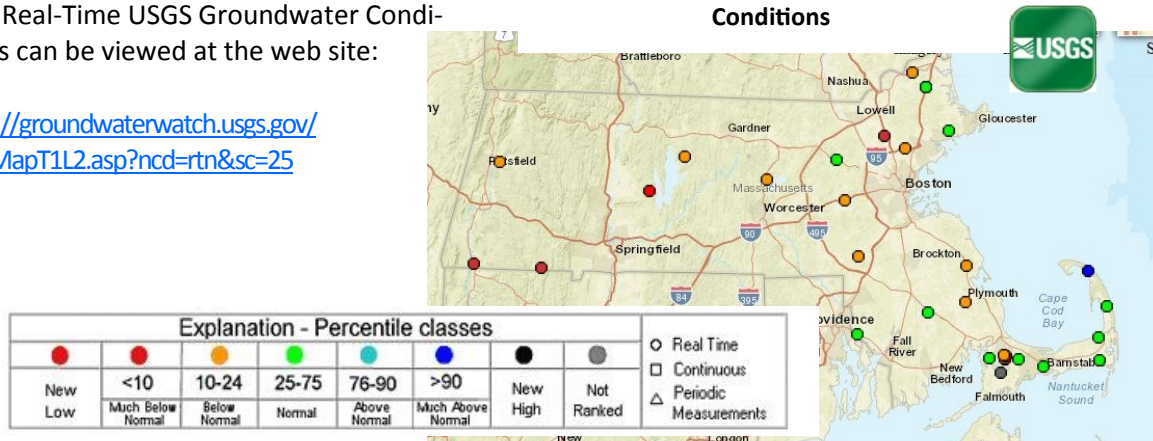
Region	Groundwater Conditions	MA Drought Management Plan Groundwater Index
Cape Cod & Islands	Normal	Normal
Central	Below Normal	Watch
Connecticut River	Below Normal	Watch
Northeast	Below Normal	Watch
Southeast	Below Normal	Watch
Western	Below Normal	Watch

**Note:** Groundwater conditions for individual wells may differ from general conditions. ND: no data

### August 3, 2016 Real-Time Groundwater Conditions

The Real-Time USGS Groundwater Conditions can be viewed at the web site:

<http://groundwaterwatch.usgs.gov/NetMapT1L2.asp?ncd=rtn&sc=25>



## RESERVOIR LEVELS

**Summary:** July reservoir levels were normal and below normal, based on percent full values, as reported by participating water suppliers.

### General Reservoir Levels in Massachusetts at the end of July 2016

Region	Reservoir Levels	MA Drought Management Plan Reservoir Index
Cape Cod & Islands	Normal	Normal
Central	Below Normal	Watch
Connecticut River	Normal	Normal
Northeast	Below Normal	Watch
Southeast	Below Normal	Watch
Western	Normal	Normal

## NWS/NOAA DROUGHT OUTLOOK AND FORECAST

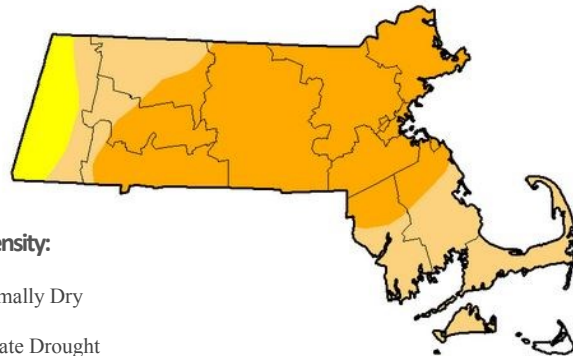
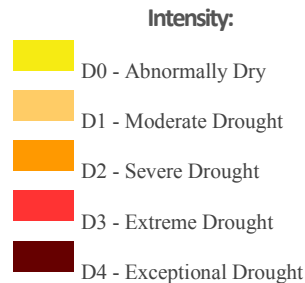
### U.S. Drought Monitor: Massachusetts August 2, 2016

**Summary:** As of August 2, 2016, the U.S. Drought Monitor shows regions of abnormally dry conditions and moderate drought in Massachusetts.

Produced by the National Drought Mitigation Center (NDMC). Intensity based on NDMC criteria.

For updated map see:

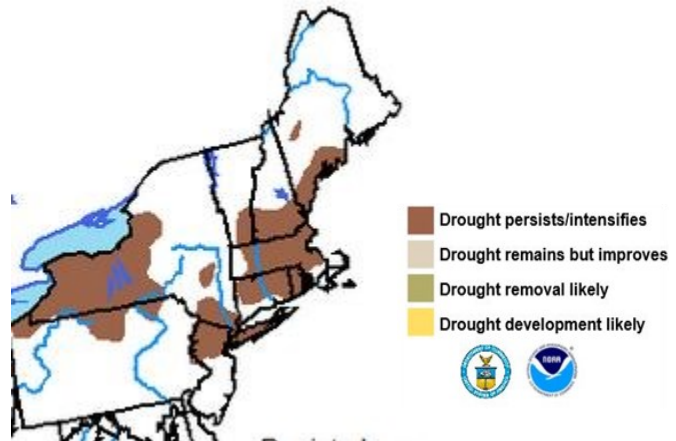
<http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?MA>



### U.S. Seasonal Drought Outlook Drought Tendency During Valid Period July 21—October 31

The NOAA/NWS/NCEP/Climate Prediction Center U.S. Seasonal Drought Outlook valid July 21– October 31 released July 21 indicates drought persistence in Massachusetts.

[http://www.cpc.ncep.noaa.gov/products/expert\\_assessment/sdo\\_summary.php](http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php)



## NOAA NATIONAL WEATHER SERVICE CLIMATE PREDICTION CENTER

The Climate Prediction Center 6-10 day Outlook valid Aug. 10-14 indicates above normal temperatures and no signal for precipitation anomaly for Massachusetts. (<http://www.cpc.noaa.gov/products/predictions/610day/>). The Center's three-month outlook for August, September, October shows above normal temperatures and no signal for precipitation anomaly ([http://www.cpc.noaa.gov/products/predictions/long\\_range/seasonal.php?lead=1](http://www.cpc.noaa.gov/products/predictions/long_range/seasonal.php?lead=1)). More information is available at (<http://www.cpc.noaa.gov/index.php>).

**Key Links:** Massachusetts Drought Management: <http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/drought-status.html>

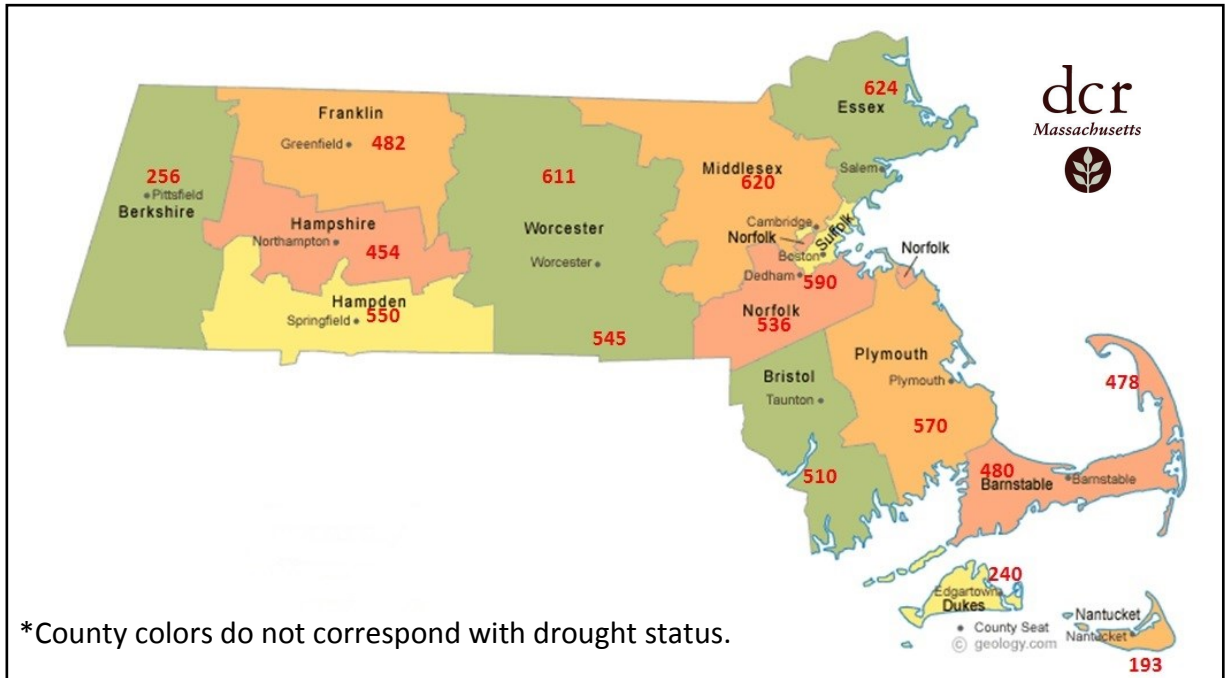
DCR Precipitation Monitoring Composite Reports and SPI

<http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/rainfall-program.html>

**August 8, 2016:** This report was prepared by the Massachusetts Department of Conservation and Recreation. Data may be preliminary in nature. Additional information, previous hydrological conditions reports, and drought management information can be found on our web site: <http://www.mass.gov/eea/agencies/dcr/water-res-protection/water-data-tracking/>

## Appendix I: Additional Information

### Keetch-Byram Drought Index DCR Forest Fire Control Districts\* as of August 4, 2016



Keetch-Byram Drought Index July 2016	
Region	MA Drought Management Plan Keetch-Byram Index
Cape Cod & Islands	Watch
Central	Warning
Connecticut River	Watch
Northeast	Warning
Southeast	Watch
Western	Advisory



## Appendix II: Description of Drought Indices

(from Table 3 of Massachusetts Drought Management Plan).

Drought Level	Standardized Precipitation Index	Crop Moisture Index*	Keetch-Byram Drought Index*	Precipitation	Groundwater	Streamflow	Reservoir***
Normal	3-month > -1.5 <u>or</u> 6-month > -1.0 <u>or</u> 12-month > -1.0	0.0 to -1.0 slightly dry	< 200	1 month below normal	2 consecutive months below normal**	1 month below normal**	Reservoir levels at or near normal for the time of year
Advisory	3-month = -1.5 to -2.0 <u>or</u> 6-month = -1.0 to -1.5 <u>or</u> 12-month = -1.0 to -1.5	-1.0 to -1.9 abnormally dry	200-400	2 month cumulative below 65% of normal	3 consecutive months below normal**	At least 2 out of 3 consecutive months below normal**	Small index Reservoirs below normal
Watch	3-month < -2.0 <u>or</u> 6-month = -1.5 to -3.0 <u>or</u> 12-month = -1.5 to -2.0	-2.0 to -2.9 excessively dry	400-600	1 of the following criteria met: 3 month cum. < 65% <u>or</u> 6 month cum. < 70% <u>or</u> 12 month cum. < 70%	4-5 consecutive months below normal**	At least 4 out of 5 consecutive months below normal**	Medium index Reservoirs below normal
Warning	6-month < -3.0 <u>or</u> 12-month = -2.0 to -2.5	< -2.9 severely dry	600-800	1 of the following criteria met: 3 month cum. < 65% and 6 month cum. < 65%, <u>or</u> 6 month cum. < 65% and 12 month cum. < 65%, <u>or</u> 3 month cum. < 65% and 12 month cum. < 65%	6-7 consecutive months below normal**	At least 6 out of 7 consecutive months below normal**	Large index reservoirs below normal
Emergency	12-month < -2.5	< -2.9 severely dry	600-800	Same criteria as Warning and previous month was Warning or Emergency	> 8 months below normal**	> 7 months below normal**	Continuation of previous month's conditions

\* The Crop Moisture Index is subject to frequent change. The drought level for this indicator is determined based on the repeated or extended occurrence at a given level.

\*\* Below normal for groundwater and streamflow are defined as being within the lowest 25<sup>th</sup> percentile of the period of record.

\*\*\* Water suppliers should be consulted to determine if below normal reservoir conditions are due to operational issues.